CHANGING RISK FACTORS FOR PERIOPERATIVE MORTALITY IN PATIENTS UNDERGOING CORONARY ARTERY BYPASS

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We analyzed preoperative and postoperative data from 1314 patients who underwent isolated coronary artery bypass from 1/6/81 through 12/30/88 to identify variables which influence risk of death during hospitalization or within 30 days of operation. Perioperative mortality for this consecutive series of patients was 1.2%, but several variables were associated with increased operative risk. Univariate analysis indicates that operative mortality is increased in patients over 70 years (3.1% vs 0.7%, P=0.003), in female patients (2.9% vs 0.8%, P<0.021), in patients with left main coronary artery stenosis (3.1% vs 0.8%, P<0.008), during emergency operations (12.0% vs 0.8%, P=0), and for operations performed within 30 days of acute myocardial infarction (4.8% vs 0.8%, P<0.001). During the interval of this study, the mean age of the patients increased from 57±9 years in 1981 to 69±10 years in 1988. Also, secondary or tertiary revascularization was performed in 5.5% of operations in 1981 and 12.6% of patients in 1988. We conclude that patient-related variables contribute importantly to operative risk for coronary artery bypass; additionally, the increasing frequency of these variables in patients referred for surgical revascularization suggests that overall mortality may increase in the current era despite improvements in surgical technique and postoperative patient care.

QUANTITATION OF INTRAOPERATIVE ISCHEMIA BY DIGITIZED TRANSESOPHAGEAL ECHOCARDIOGRAPHY.

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The clinical application of transesophageal echocardiography (TEE) for detection of intraoperative ischemia requires objective wall motion criteria for ischemic events. To develop these criteria, we recorded TEE digital cine loops of the LV short axis for wall motion, 8-lead ECG for ischemia, and pulmonary wedge and arterial pressures for hemodynamics during coronary bypass surgery in 21 pts. Regional wall motion was measured as area ejection fraction (AEF) of octants of the LV short axis view (fixed reference system). ECG criteria for ischemia were new >0.5mm ST segment elevation or depression. Best wall motion variables for ischemia were: 1) a decrease in any octant AEF of >.30, sensitivity (SENS) = 69%, specificity (SPEC) = 88% (p<.01), 2) a decrease in octant AEF of >.10 to an AEF of.30 or less, SENS = 69% and SPEC = 95% (p<.01) and 3) an increase in the standard deviation of octant AEF's from the mean, SENS = 84% and SPEC = 52% (p<.05). There was no significant association between percent change in pressures and ischemia. In conclusion, we have defined sensitive and specific wall motion criteria for ischemia that should prove useful for the intraoperative evaluation of digitized TEE images. Even small decreases in regional wall motion by TEE may achieve clinically useful SENS and SPEC for intraoperative ischemia.

PATHOPHYSIOLOGY OF CORONARY SINUS LIGATION: IS CORONARY SINUS LIGATION FEASIBLE ?

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The use of the coronary sinus (CS) interventions may lead to CS injury. The distal (great cardiac vein) region of the CS is at higher risk to injury than the proximal (aortial) region. Attempted surgical repair of the CS is difficult and may ultimately result in ligation. We studied the pathophysiology of distal CS ligation (CSL) as compared to proximal CSL.

Ten domestic pigs had proximal CSL and 10 pigs had distal CSL. Myocardial function was assessed using hemodynamics, including the CS pressure (CSP), and segmental wall motion (sonomicrometry), at 30 minute intervals for 2 hours following CSL.

Two hours after ligation the increase in CSP was significantly higher in proximal CSL. Myocardial function was more depressed in proximal CSL with a lower left ventricular stroke work (LVSW) and higher heart rate (HR). Segmental end diastolic length (EDL) showed dilation along with a decline in segmental contraction (SgL) in proximal CSL while the middle CSL showed a reduced EDL.

	Distal		Proximal	
	Control	2 Hrs	Control	2 Hrs
CSP (mmHg)	3	31+	4	60+*
HR (b/min)	78	105	91	144+*
LVSW (gm)	19.0	11.6+	22.6	7.0+*
SgL (%)	12.2	10.3	10.9	4.7+
EDL (%)	100	95+	100	116+*

+ P <.02 vs Control, * P <.02 Distal vs Proximal

Nine pigs with proximal CSL died approximately 2 hours after ligation and 1 survived while all pigs with distal CSL were long term survivors.

Preliminary pathological findings in distal CSL reveal acute subepicardial edema in the left ventricular free wall while in the proximal CSL the edema also included the subendocardium including the septum.

We conclude ligation of the distal CS is feasible and associated with acute mild cardiac dysfunction. It is a viable alternative to attempted repair.

TWENTY YEARS OF CORONARY ARTERY BYPASS SURGERY

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To determine the long term experience of aortocoronary artery bypass surgery (CAB) we reviewed the data of 36,155 consecutive patients (pts) who underwent isolated CAB in our institution from 1969-88. There were 30,639 men (84.7%) and 5,516 women (15.3%). Overall early mortality was 2.9%. Long term follow-up revealed that symptomatic improvement occurred in 86% of the survivors. Actuarial analysis revealed that 78% of the pts continued to be free from angina for 5 yrs, 54% for 10 yrs and 30% for 15 yrs. Actuarial analysis revealed and overall 5-yr survival (YS) of 92%, 10-YS of 76% and 15-YS of 47%. 5-YS and 10-YS for men were 93% and 77% and for women were 91% and 76%, respectively. For pts<70 yrs, 5-YS and 10-YS were 93% and 78%. For pts≥70 yrs, 5-YS and 10-YS were 84% and 55%, respectively. 5-YS regardless of the number of vessels bypassed ranged from 92 to 94%, 10-YS from 77 to 82%, and 15-YS from 44 to 63%. Survival according to age is shown:

	30-39 YRS	40-49	50-59	60-69	70+
5-YS	94%	95%	94%	91%	83%
10-YS	81%	83%	80%	71%	55%
15-YS	63%	59%	48%		

Of the survivors, 97% were free from reoperation in 5 yrs, 86% in 10 yrs and 70% in 15 yrs. The safety and good long term results achieved with CAB among our pts support the efficacy of the procedure in the treatment of CAD. These results further indicate that CAB increases life expectancy among CAD pts.